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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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7590

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EXAMINER

NATNAEL, PAULO S M

ART UNIT

PAPER NUMBER

2614

DATE MAILED: 03/20/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/577,478

Applicant(s)

HEATH, THOMAS S.

Examiner

Paulos M. Natnael

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims **1-22** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Eppler**, U.S. Pat. No. **6,084,989** in view of **Szeliski et al.**, U.S. Pat. No. **6,157,747**

Considering claim **1**, Eppler discloses the following claimed subject matter, note;

- a) the claimed method of extracting a sequence of video frames is met by Patch Extractor 17, FIG.2, which receives image frame and extracts an image patch.
- b) the claimed method of sampling each of the video frames is met Image Restoration 24, FIG.2;
- C) the claimed method of interpolating the up sampled video frames is met by Statistics computation and gray scale enhancement 25, FIG. 2, which "forms an enhanced version of the image E(c,r) which is input to selected ones of the matching algorithms 23 for processing to compute the offset errors." (Col. 6, lines 34-36)

Except for;

- d) the claimed method of aligning the **interpolated** video frames;

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e) the claimed method of creating a single image from the aligned video frames;

Regarding d), ^{Ep}Eppler doesn't specifically use the term alignment. However, Eppler discloses that "...The up sampled boundary and area data are processed by one or more matching algorithms 23 that produce column and row offset errors and a figure of merit regarding the match between the predicted landmark and the actual landmark in the image." (Col. 6, lines 15-20) Eppler also discloses that "Six different image matching algorithms 23 were investigated ...The image matching algorithms 23 include centroid image matching, edge matching, cluster reward, minimum variance, cross correlation, and normalized cross correlation algorithms 23." (Col. 6, lines 43-49) *Eppler 20 is Landmark Positioning system.*

Szeliski et al., discloses a 3-dimensional image rotation method and apparatus for producing image mosaics which invention "aligns a set of plural images to construct a mosaic image". (see Abstract) Specifically, Szeliski et al., discloses image alignment using patch-based algorithm, 120 (FIG.1).

Therefore, it would have been obvious to the skilled in the art at the time the invention was made to readily recognize the matching algorithms 23 of Eppler and the image alignment (using patch-based algorithm) of Szeliski et al. and replace/provide the latter in the system of Eppler and modify the same.

Regarding e), see rejection of (d).

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Considering claim 2, the claimed method wherein the sequence of video frames are low resolution images is inherent, because the system produces a "higher resolution display generated" (col. 13, lines 16-22 after the images have been processed.

Considering claim 3, the claimed method wherein said up sample step is by a factor of 4 is met by image restoration (up sample 7x4), FIG.2; (see also col.14, lines 52-56)

Considering claim 4, the claimed method wherein said align step comprises aligning the video images in an x direction and a y direction in a center portion of interest in each video frame is inherent, because alignment of images entails in all directions.

Considering claim 5, the claimed comprising extracting the sequence of video frames at 30 frames/sec is inherent, because the rate of 30 frames/sec is standard in video/television systems.

Considering claim 6, the claimed wherein the sequence of video frames includes 5 video frames.

Regarding claim 6, Eppler doesn't specifically disclose a sequence of video frames including 5 video frames. However, it would be obvious to the skilled in the art that this is a design choice.

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Considering claim 7, the claimed method of correlating the up sampled video images is met by the "cross correlation algorithm 23" (col. 6, 48-49)

Considering claim 8, the claimed rising averaging a pixel intensity from each of the up sampled video frames is met by the disclosure that "The average and the variance are computed for a all gray-scale pixel values with the landmark perimeter." (Col. 9, lines 31-33)

Considering claim 9, the claimed comprising compensating for platform movement and rotation zoom is met by the disclosure that "...Eliminating scale factor and rotation errors preserves the sharpness of the correlation surface peak and improves the reliability and accuracy of image matching." (Col. 15, lines 24-27)

Considering claim 10, the claimed aligning each the extracted sequence of video frames **before** said **up sample** step;

Regarding claim 10, Eppler up samples and performs matching algorithm. However, it would be a design choice whether to up sample (magnify) the images after or before alignment. Therefore, it would have been obvious to the skilled in the art at the time the invention was made to readily recognize the teaching of the prior art and provide an alignment after or before the up sample step.

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Considering claim **11**, The method of claim 1, comprising identifying commonality from one individual frame to the next and overlapping the individual frames and displaying an image representing a continuous area.

Regarding claim **11**, Eppler doesn't specifically disclose overlapping the individual frames. However, Eppler discloses the image patch that uses Matching algorithms **23**. Szeliski et al. discloses image alignment utilizing patch-based algorithm. Therefore, it would have been obvious to the skilled in the art at the time the invention was made to readily recognize the teaching of Eppler and provide the system of Szeliski to modify the system of Eppler in order to provide the capacity of overlapping the individual frames.

Considering claim **12**, The method of claim 11, comprising extracting the sequence of video frames at 30 frames/sec is **inherent**, because the rate of 30 frames/sec is standard in television systems.

Considering claim **13**, the claimed wherein the sequence of video frames includes 5 video frames.

Regarding claim 6, Eppler doesn't specifically disclose a sequence of video frames to include 5 video frames. However, it would be obvious to the skilled in the art that this would be a design choice to specify a number of video frames in the a sequence

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Considering claim **14**, the claimed correlating the up sampled video images is met by the "cross correlation algorithm 23" (col. 6, 48-49)

Considering claim **15**, the claimed averaging a pixel intensity from each of the up sampled video frames.

Regarding claim **15**, see rejection of claim **8**.

Considering claim **16**, The claimed comprising compensating for platform movement and rotation zoom.

Regarding claim **16**, see rejection of claim **9**.

Considering claim **17**, the claimed method of claim **16**, comprising aligning each the extracted sequence of video frames **before** said **up sample** step.

Regarding claim **17**, see rejection of claim **10**.

Considering claim **18**, The method of claim **17**, comprising identifying commonality from one individual frame to the next and overlapping the individual frames and displaying an image representing a continuous area.

Regarding claim **18**, see rejection of claim **11**.

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Considering claim **19**, see rejection of claim **5**.

Considering claim **20**, see rejection of claim **1**.

Considering claim **21**, see rejection of claim **1**.

Considering claim **22**, Eppler discloses the following claimed subject matter, note;

- a) the claimed processor is met by the computer-system 16, FIG. 1;
- b) the claimed memory coupled to said processor is inherent in computer-systems.
- c) the claimed memory having stored therein sequences of instructions when executed by said processor, causes said processor to perform the steps is met by the disclosure in FIG.4. (See also rejection of claim 1).
- d) the claimed steps of extract a sequence of video frames; up sample each of the video frames; interpolate the up sampled video frames; align the interpolated video frames; and create a single image from the aligned video frames;

Regarding d), see rejection of claim **1**.

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Conclusion

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Burt et al. , U.S. Pat. No. 5,649,032 discloses a system for automatically aligning images to form a mosaic image.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Paulos Natnael** whose telephone number is **(703) 305-0019**. The examiner can normally be reached on **Monday through Thursday** from **8:00 a. M. to 5:00 p.m.** The examiner can also be reached on alternate **Fridays**.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **John Miller**, can be reached on **(703) 305-4795**.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is **(703) 305-3900**.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

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or faxed to:

(703) 872-9314, (for formal communications intended for entry)

or:

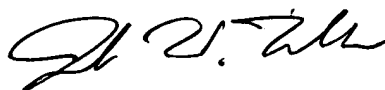
(703)872-9314 (for informal or draft communications, please label "PROPOSED" OR "DRAFT").

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, V.A. Sixth Floor (Receptionist).

Paulos M. Natnael

March 7, 2002

PMN



**JOHN W. MILLER
PATENT EXAMINER**